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(54) Title: MAPPING OF PACKETS TO PDP CONTEXTS IN MULTISESSION CONNECTION
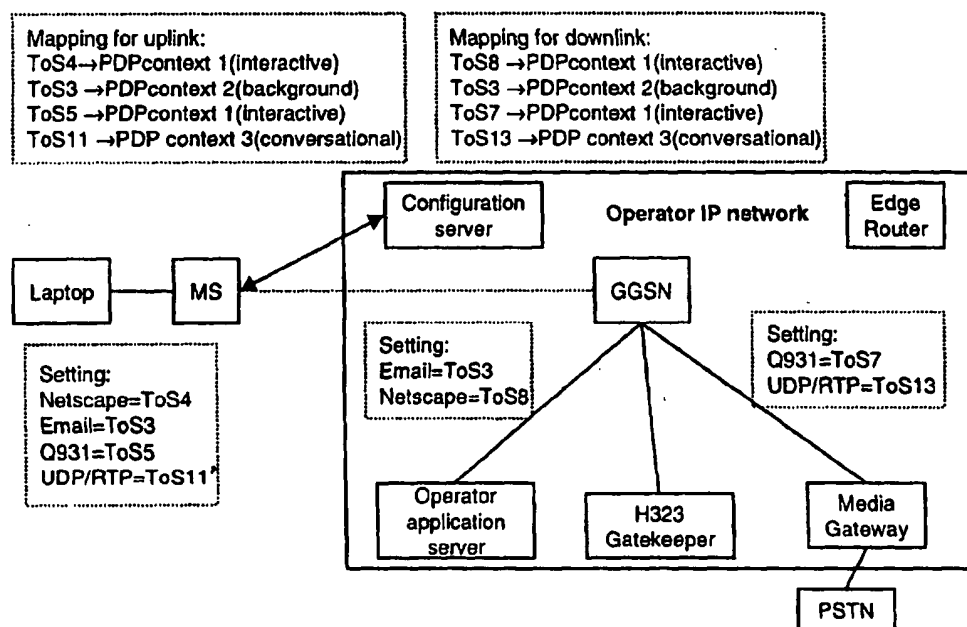
(57) Abstract: Routing packets belonging to different quality of service flows in a packet data network system is described. For each application initiated by a subscriber equipment with an associated quality of service flow in a multi-session connection settings of a network node hosting the application are obtained. From the obtained settings configuration information are determined and packets are routed from the network system to the subscriber equipment for each initiated application in accordance with the configuration information.

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TITLE OF ⬤ INVENTION ⬤

Mapping of Packets to PDP Contexts in Multisession Connection

5 FIELD OF THE INVENTION

The present invention relates to the dynamic configuration of
a user equipment or the applications inside the user
equipment capable of connecting to a variety of external
10 networks (e.g. Internet, Intranet) through an access
technology supporting multiple QoS flows. The invention is
particularly relevant for the mapping of data packets to PDP
contexts for GPRS (General Packet Radio Service) subscribers
having multiple sessions and applications active
15 simultaneously.

BACKGROUND OF THE INVENTION   ,

Typical networks such as an Internet network may be accessed
20 through a variety of ways (GPRS, WLAN, ADSL modem, etc.). In
addition, many access technologies support multiple QoS flows
(GPRS, ADSL, RSVP, etc.). For the same time, the same user
equipment is often used to access different networks. A
typical illustration is a GPRS network where a user equipment
25 may be connected to the Internet or an Intranet using
different Access Points. GPRS is the packet technology used
in GSM and in UMTS (using WCDMA (Wideband Code Division
Multiple Access)radio)). In GPRS, each QoS flow is associated
to a PDP context (logical connection from user equipment to
30 external network).

In a PDP (Packet Data Protocol) Context Activation Procedure
as shown in Fig. 1, an MS (Mobile Station) sends an Activate
PDP·Context Request message comprising PDP Type, PDP Address,
35 APN (Access Point Name) and QoS (Quality of Service)
Requested to an SGSN (Serving GPRS Support Node) in a PLMN
(Public Land Mobile Network). QoS Requested indicates the

desired QoS profile. The SGSN validates the Activate PDP
Context Request optionally using PDP Type, PDP Address and
APN.

5   If a GGSN (Gateway GPRS Support Node) address can be derived,
the SGSN sends a Create PDP Context Request message
comprising PDP Type, PDP Address, APN and QoS Negotiated to
the affected GGSN. The GGSN may use the APN to find an
external network. A Selection Mode indicates whether a
10   subscribed APN was selected, or whether a non-subscribed APN
sent by the MS or a non-subscribed APN chosen by the SGSN was
selected. The GGSN may use the Selection Mode when deciding
whether to accept or reject the PDP context activation. For
example, if an APN requires subscription, then the GGSN is
15   configured to accept only the PDP context activation that
requests a subscribed APN as indicated by the SGSN with
Selection Mode. The GGSN creates a new entry in its PDP
context table and creates a Charging Id. The new entry allows
the GGSN to route PDP PDUs (Packet Data Units) between the
20   SGSN and the external PDP network and to start charging. The
GGSN returns a Create PDP Context Response message comprising
PDP Address, QoS Negotiated and Charging ID to the SGSN.

If QoS Negotiated received from the SGSN is incompatible with
25   the PDP context being activated, then the GGSN rejects the
Create PDP Context Request message.

The SGSN returns an Activate PDP Context Accept message to
the MS. The SGSN is now able to route PDP PDUs between the
30   GGSN and the MS and to start charging.

GPRS can support different QoS flows, each corresponding to a
PDP context, for a unique PDP address (e.g. Ipv4 or Ipv6
address). In 3GPP Release 99 the QoS mechanism uses a set of
35   filters called Traffic Flow Template (TFT) and information in
the IP header, such as Type of Service (ToS) field or UDP

(User Datagram Protocol) port number in order to determine to
which PDP context an IP packet belongs.

The MS maps uplink packets to the proper PDP context, and
5 GGSN maps downlink packets to the proper PDP context using
TFT. It is to be noted that the MS configures the GGSN TFT.

While such QoS mechanism allows to differentiate traffic, it
may not always be easy to use for various reasons:
10 - applications do not always use fixed port numbers,
- end-to-end encryption may render the UDP port number
inaccessible for the GGSN,
- ToS values are selected by the operator, so an application
may have different ToS values in different networks, and/or
15 - ToS values may be changed by edge routers at the point of
interconnection between two ISPs (Internet Service
Providers).

A typical application example is an H323 call. Relying on the
20 port number is not useful since some H323 family protocols
e.g. H245 use dynamic port. Using the port number will be
just impossible if encryption is used.

Usually, the end point of an IP connection of the user
25 equipment is a server in an IP network, which is controlled
by the operator of the IP network, for example a Call Server,
or the end point is a server in the Internet or Intranet,
which is not controlled by the IP network operator.
However, communication may also be established between two
30 user equipments (e.g. VoIP call), connected through different
operators' networks.

Hence, the general problem is how to properly configure QoS
for applications which may connect through different access
35 and to different networks, in particular, the QoS parameters
used by the access technology, the filter used to select the

proper QoS ▮ow, and QoS parameters (e.g. ▮oS) used in the
network where the connection is established. An additional
problem is how to set filters for applications which do not
use fixed port number, or for which the port number cannot be
5 read due to encryption. A further problem is that ToS setting
is most often proprietary.

SUMMARY OF THE INVENTION

10 It is therefore an object of the present invention to solve
the above-mentioned problems and to provide QoS related
configuration for every application even if encryption is
used.

15 According to the present invention, this object is achieved
by a system according to claim 1. Moreover, the object is
achieved by a configuration device according to claim 14. In
addition, the object is achieved by a method according to
claim 19.
20
According to the present invention, a packet data network
system for routing packets belonging to different quality of
service flows comprises a subscriber equipment for initiating
applications with associated quality of service flows in a
25 multi-session connection. The subscriber equipment may
comprise a laptop or the like and a "modem" or access device
(e.g. ADSL modem or mobile station) for transmitting data
packets to a packet data network like an operator IP network.
The subscriber equipment may also integrate application and
30 modem in the same device such as a Nokia communicator.

It is important to distinguish two cases:
     - the application is tightly integrated to the access
       technology, so that it can indicate the QoS needed and
35   the QoS flow that it should use. This is typically but
       not necessarily the case of an integrated device.

- the application is not tightly integrated to the access
  technology, so that it may indicate the QoS needed using
  generic API, and cannot directly identify the QoS flow
  that is should use. Instead the modem needs to map the

5   traffic received from different applications to
  different QoS flows using its own filters. This is
  typically but not necessarily the case of a separated
  device.

10   The system further comprises a configuration device like a
  configuration server (e.g. policy server) which may be
  located in the operator IP network. The configuration device
  obtains, for each initiated application, type of service
  information of a network node hosting the application, such

15   as an operator application server, media gateway, H323
  gatekeeper, laptop, etc. Then, the configuration device
  provides the configuration information to the subscriber
  equipment. This information is derived from the obtained type
  of service information and possibly from the operator policy.

20   This information includes QoS parameter defining QoS flow
  (e.g. GPRS QoS profile), filters for uplink and downlink
  (e.g. TFT), and parameters to be used by the application (ToS
  or port number).

25   The system further comprises a gateway node, like a GGSN,
  connecting the access technology to the operator IP network,
  for exchanging packets between the network and the subscriber
  equipment. This gateway should select the proper QoS flow for
  each application using filters using for example ToS field of

30   incoming packets. The subscriber equipment uses the obtained
  configuration information to set the filters and the
  associated quality of service flow in the gateway node.
  The gateway node is able to route the packets into the proper
  QoS flow on the basis of the filter set by the user equipment

35   and the packet header (e.g. ToS field). It should be noted
  that the User equipment sets the filter in the gateway node

because if dynamic configuration is not used, the application
in the user equipment is the only entity capable of properly
setting the filter. This is the case in GPRS where MS sets
TFT. It is assumed that the same generic mechanism is kept
5 with dynamic configuration, so that filters of the gateway
node are set by the user equipment.

The type of service information (or other field used by the
filter) marked in the packets sent by an application may be
10 determined by an operator of the network hosting this
application. In a preferred embodiment, this ToS is set by
the same configuration device into the various applications.
In this case the configuration device obtains these
parameters directly. If the application is located in a
15 different network connected through an edge router capable of
changing the type of service information of the IP packets,
the same configuration device may configure the edge router
and obtain type of service used by the application in the
other network. The configuration device will then know with
20 what type of service information the packet will be marked
which belongs to a certain application arriving at the
gateway node.

If the configuration device cannot configure the parameters
25 set by the application directly (e.g. the application is not
implementing dynamic configuration), the configuration device
may further obtain settings, such as Type of Service (ToS)
information (i.e. DiffServ codepoints), of the application(s)
in the subscriber equipment and provide to the subscriber
30 equipment the configuration information. This configuration
information is preferably filters based on the type of
service information and appropriate QoS parameters. This is
illustrated in Fig. 2, where when knowing the settings of the
application and the operator policy (here Netscape and Q931
35 use interactive class, Email uses background class and
UDP/RTP uses conversational class), the configuration device

can indicate the proper filters to the subscriber equipment
(e.g. Mobile station). The subscriber equipment then uses the
ToS field of the IP packets coming from an application and
the filter to map this uplink packet into the appropriate QoS
5   flow (e.g. PDP context). The subscriber equipment transmits
packets to the network for each initiated application in
accordance with the associated quality of service flow mapped
in the subscriber equipment.

10 Further, in order to properly configure the Gateway (e.g.
GGSN), the subscriber equipment may need to know the mapping
for downlink. This set of filters (e.g. TFT) is first sent
from the configuration device to the subscriber equipment and
then from the subscriber equipment to the gateway. The
15 gateway is then able to transmit every downlink packet into
the right QoS flow.

The configuration device may further obtain setting
information in a variety of ways:
20 First, settings are often very static. For example, a certain
type of application uses a fixed UDP port. Some other
application may always use same ToS information. In such
case, the settings information is just public knowledge.
In a second embodiment, the application may have configurable
25 settings. In this case, the operator may be able to provide
this configuration to the user. He may pre-configure it
before selling the application to the user, or he may use
remote configuration, or he may have an agreement with the
Information Management (IM) department of a corporate who
30 will install proper settings. This last case assumes that the
corporate has a special agreement with the operator.

The present invention presents a method for dynamically
configuring a user equipment and an application in the user
35 equipment, so that packet traffic of the application is sent
through proper QoS flow using appropriate QoS parameters.

Packets are routed in the proper QoS flow using filters.
These filters use information contained in the packet header
such as ToS information for mapping packets to associated QoS
flows (e.g. PDP contexts). Thus, the level of QoS needed by
5   an application is provided. The present invention provides
means for configuring uplink and downlink filters and their
associated QoS flow for every application or protocol used by
a user equipment.

10 In the following the present invention will be described by
way of preferred embodiments thereof with reference to the
accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

15

Fig. 1 shows a PDP Context Activation Procedure.

Fig. 2 shows a schematic block diagram of a network system
comprising a configuration server according to the present
20 invention.

Fig. 3 shows a system where a policy server uses COPS to
dynamically configure the user equipment.

25 Fig.4 shows a system where a configuration server uses WAP to
dynamically configure the MS.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

30 Fig. 2 shows a network system according to GPRS. A Mobile
Station (MS) to which a laptop can be connected can initiate
multiple sessions in order to use applications or protocols
hosted in an operator IP network by an operator application
server, a media gateway and/or an H323 gatekeeper, for
35 example. For each session a PDP context with a requested QoS
is activated by the MS in an SGSN (not shown) towards a GGSN

in the operator IP network. The GGSN then has to map downlink
packets belonging to the different applications or protocols
to the proper PDP contexts or QoS flows.

5   According to the present invention, a dedicated, network-
     specific configuration server keeps track of the ToS settings
     of applications hosted within the network system.

     According to an embodiment of the present invention, the
10   configuration server knows how the laptop sets the ToS bits
     for every application. The configuration server obtains its
     knowledge from the corporate IT (Information Technology)
     staff, or from the software the operator provides to the user
     (preferably remotely). In case of a communicator like
15   integrated MS, the operator knows the ToS setting from the
     mobile type or manufacturer and provides the knowledge to the
     configuration server.

     According to another embodiment, the operator may be able to
20   configure the mobile setting, i.e. the mapping between the
     application and the ToS bits. This could be done by using a
     default standard or an agreed standard.

     The configuration server is provided with the ToS information
25   of the applications hosted in the operator network. For
     example, the configuration server knows how the application
     server sets the ToS bits. This is a straightforward
     configuration if the application server is owned by the
     operator or an operator partner. The setting may also be
30   known if the application server is set up by corporate staff
     and the operator has an agreement with the corporate. A
     particular important application server is a Call Server
     which is foreseen to be managed by the operator. The
     knowledge about the setting may also be derived from default
35   standard or agreed standard.

When the subscriber initiates a session in order to use an
application hosted in the operator IP network shown in Fig.
2, the configuration server of this IP network provides the
MS with ToS information of the application in order to inform
5   the MS how it should configure its own TFT and the GGSN TFT.
The operator may use MExE (Mobile application Execution
Environment) to update MS configuration, i.e. mapping of ToS
to PDP context. When the MS configures the TFT to be used in
the GGSN for that session it is able to specify the correct
10 ToS information and the GGSN can use the ToS information when
routing packets to several simultaneous sessions of the same
subscriber.

Alternatively, the ToS information may be initially delivered
15 from the configuration server to the MS over a single-session
connection from the subscriber to the application when it is
self-evident to the GGSN which PDP context to use.

In case there are EDGE routers that interfere with ToS
20 information being passed, the configuration server
application needs to be aware of the nature of the
interference and be able to counteract this interference. In
case of an operator's own edge router its behaviour can
easily be known and counteracted by the configuration server.
25

Fig. 2 shows an example of ToS settings and PDP context
mappings. The configuration server knows the ToS settings of
the laptop for Netscape (=ToS4), Email (=ToS3), Q931 (=ToS5)
and User Datagram Protocol(UDP)/Real Time Protocol (RTP)
30 (=ToS11) and provides these ToS settings to the MS and
informs the MS how to configure its TFT, i.e. how to map the
uplink ToS to PDP context. As shown in Fig. 2, the MS maps
ToS4 to PDP context 1 (interactive), ToS3 to PDP context 2
(background), ToS5 to PDP context 1 (interactive) and ToS11
35 to PDP context 3 (conversational).

Moreover, the configuration server knows the ToS settings of
the operator application server (Netscape=ToS8), Email=ToS3)
and the media gateway (Q931=ToS7, UDP/RTP=ToS13), which host
the initiated applications. The configuration server provides
5   these settings to the MS and informs the MS how to configure
the GGSN TFT, i.e. how to map the downlink ToS to PDP
context. The MS configures the GGSN TFT accordingly, so that
the GGSN maps ToS3 to PDP context 2, ToS8 to PDP context 1,
ToS13 to PDP context 3 and ToS7 to PDP context 1. Hence, the
10 downlink packets are mapped by the GGSN to the same PDP
context as the corresponding uplink packets.

A different signaling flow showing how to configure the
Mobile Station is depicted in Figs. 3 and 4.
15
Fig. 3 shows a PDP context activation where the GGSN checks
the authorization from a policy server using a COPS-pull
request (communication 3 in Fig. 3). The COPS-pull request
contains user identity, user IP address, QoS requested, TFT,
20 authorization token, an indication of intended use of the PDP
context if available (e.g. signaling PDP context), MS
capability and other relevant parameters. If the policy
server authorizes the PDP context, the policy server sends a
COPS decision to the GGSN (communication 4 in Fig. 3) and may
25 further send configuration information directly to the MS
using COPS-push (communication 7 in Fig. 3). This
configuration information contains a list of filter(s), and
associated with every filter: Diffserv marking, UMTS QoS
profile, TFT and APN. In addition, an application server IP
30 address to be used by different applications may be sent.
Note that APN may be set to wild card to indicate that any
APN would be acceptable. This information is not limited to
the configuration information needed by one application, but
may cover all applications for which the MS has rights and
35 capabilities to handle. The capabilities are deduced from a
new information element "MS capability" which is an addition

to existing PDP context activation procedure proposed in this
application. "MS capability" covers QoS support (maximum bit
rate supported by the MS; list of traffic classes supported)
and list of applications installed in the MS. This
5 information will be received by the MS.

The application server IP address (such as WAP Gateway
address currently hard-coded) may then be dynamically set in
the MS.
10

In a first embodiment, the case in which an application is
not configurable by the MS, i.e. typically implemented on a
separate device, is described.

15 According to the first embodiment, the MS behaves in the
following way. If an uplink packet is received by the MS, the
MS will first check it against the filter (e.g. UDP port
8080). The filter indicates to the MS with which Diffserv
codepoints this uplink packet is to be marked and with which
20 UMTS QoS profile it should be sent over the radio. The MS
will then check whether a suitable PDP context exists
(similar QoS and same PDP type, acceptable APN) to send the
packet directly. If such a PDP context is found the packet is
sent in this PDP context. If no suitable PDP context exists,
25 the MS will activate a suitable PDP context. After the PDP
context activation, the packet will be sent in this PDP
context. The PDP context may be deleted after no traffic has
been sent during a certain time.

30 In a second embodiment, the case in which an application is
configurable by the MS, i.e. typically implemented in the MS,
is described.

According to the second embodiment, the MS uses the
35 configuration information received in communication 7 in Fig.
3 to configure the application. The application properly

marks the IP packet based on the marking information sent in
the COPS-push message. If the application needs to send a
packet, it first requests a PDP context activation with
appropriate QoS, appropriate APN, and appropriate TFT.

5

Fig.4 shows a system where a configuration server uses WAP-
(Wireless Application Protocol)push to dynamically configure
the application in the MS. WAP-Push includes in its
addressing the application ID, and therefore is well suited
10 to address an application directly.

When a PDP context is created, the GGSN sends to a
configuration server a RADIUS start accounting message
(communication 3 in Fig. 4) containing user identity (e.g.
15 IMSI, MSISDN), user IP address, QoS requested, an indication
of intended use of the PDP context if available (e.g.
signaling PDP context), MS capability and other relevant
parameters. When the PDP context will be deactivated a RADIUS
stop accounting message is also sent to the configuration
20 server. Therefore the configuration server is aware whether
the MS is connected or not.

The configuration server sends an acknowledge message to the
GGSN (communication 4 in Fig. 4) and further sends a WAP-push
25 message directly to the application(s) it needs to configure
(communication 7 in Fig. 4). This message contains
configuration information such as filter (mapping for
uplink), Diffserv marking, UMTS QoS profile, TFT (mapping for
downlink), APN and application server IP address to be used
30 by this application.

While the invention has been described with reference to
preferred embodiments, the description is illustrative of the
invention and is not to be construed as limiting the
35 invention. Various modifications and applications may occur
to those skilled in the art without departing from the true

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spirit and scope of the invention as defined by the appended claims.

CLAIMS:

1. A packet data network system for routing packets belonging
to different quality of service flows, the system comprising:
5   a subscriber equipment for initiating applications with
associated quality of service flows in a multi-session
connection;
         a configuration device for obtaining, for each initiated
application, settings of a network node hosting the
10 application, and for providing configuration information
based on these settings to the subscriber equipment; and
         a gateway node for exchanging packets between the
network system and the subscriber equipment; wherein
         the subscriber equipment is arranged to provide the
15 gateway node with the configuration information; and
         the gateway node is arranged to route the packets in
accordance with the configuration information.

2. A system according to claim 1, wherein the configuration
20 information comprises quality of service parameters defining
quality of service flow.

3. A system according to claim 1, wherein the configuration
information comprises filters for uplink and downlink.
25

4. A system according to claim 1, wherein the configuration
information comprises parameters to be used by the
application.

30 5. A system according to claim 1, wherein the settings
comprise type of service information.

6. A system according to claim 1, wherein the configuration
device is further arranged to derive the configuration
35 information on the basis of the operator policy.

                                - 16 -

7. A system according to claim 1, wherein the needed quality
of service flow is determined by the application directly.

8. A system according to claim 1, wherein
5   the configuration device is further arranged to obtain
settings of the subscriber equipment for each initiated
application and to provide configuration information based on
these settings to the subscriber equipment; and
         the subscriber equipment is arranged to transmit packets
10 to the network system for each initiated application in
accordance with the configuration information.

9. A system according to claim 1, wherein the settings of the
network node hosting the application are determined by an
15 operator of the network node.

10. A system according to claim 1, wherein the settings of an
application are fixed.

20 11. A system according to claim 1, wherein the settings of an
application are determined by an operator.

12. A system according to claim 1, wherein, in case the
gateway node is arranged to route the packets on the basis of
25 the settings of the hosting network node, the configuration
device is arranged to provide the configuration information
to the subscriber equipment over a single-session connection
from the subscriber equipment to the hosting network node.

30 13. A system according to claim 1, further comprising:
         an edge network node capable of changing the settings of
a hosting network node; wherein
         the configuration device is arranged to obtain settings of
the edge network node and to provide configuration
35 information based on the edge network node settings.

14. A configuration device for supporting mapping packets to
quality of service flows in a packet data network system, the
device comprising:

   means for obtaining, for each application initiated by a
5   subscriber equipment with an associated quality of service
flow in a multi-session connection, settings of a network
node hosting the application; and

   means for providing configuration information based on
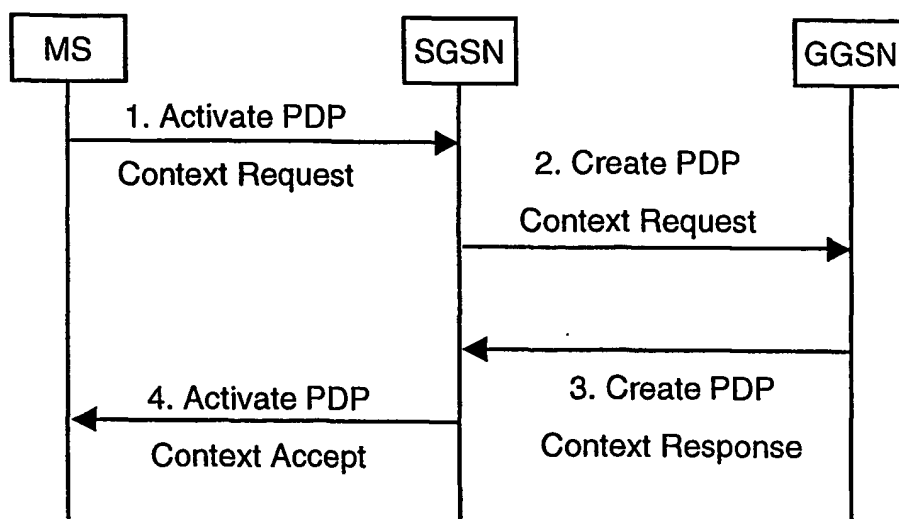these settings to the subscriber equipment enabling the
10 subscriber equipment to map setting information to the
associated quality of service flow.

15. A configuration device according to claim 14, further
comprising means to derive the configuration information on
15 the basis of the operator policy.

16. A configuration device according to claim 14, further
comprising means to obtain settings of the subscriber
equipment for each initiated application and to provide
20 configuration information based on these settings to the
subscriber equipment for enabling the subscriber equipment to
transmit packets to the network system for each initiated
application in accordance with the configuration information.

25 17. A configuration device according to claim 14, wherein, in
case a gateway node is arranged to route packets on the basis
of the settings of the hosting network node, the
configuration device comprises means to provide the
configuration information to the subscriber equipment over a
30 single-session connection from the subscriber equipment to
the hosting network node.

18. A configuration device according to claim 14, further
comprising means to obtain settings of an edge network node
35 capable of changing the settings of a hosting network node,

and to prov... configuration information based on the edge
network node settings.

19. A method of routing packets belonging to different
5   quality of service flows in a packet data network system, the
method comprising the steps of:
        obtaining, for each application initiated by a
subscriber equipment with an associated quality of service
flows in a multi-session connection, settings of a network
10 node hosting the application;
        providing configuration information based on these
settings to the subscriber equipment;
        providing a gateway node for exchanging packets between
the network system and the subscriber equipment with the
15 configuration information; and
        routing the packets in accordance with the configuration
information.

20. A method according to claim 19, further comprising the
20 steps of:
        obtaining settings of the subscriber equipment for each
initiated application and providing configuration information
based on these settings to the subscriber equipment; wherein
        packets are transmitted from the subscriber equipment to
25 the network system for each initiated application in
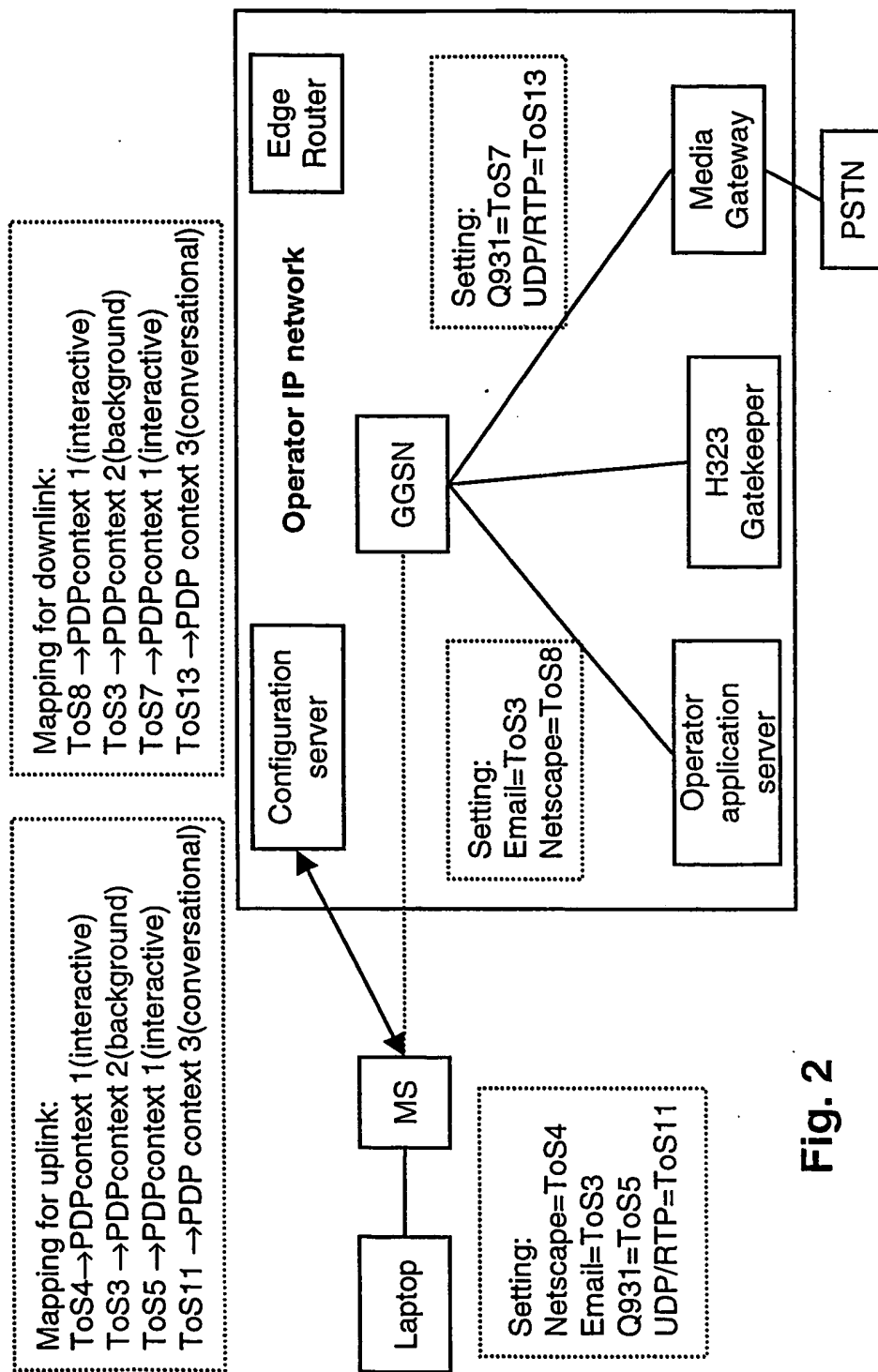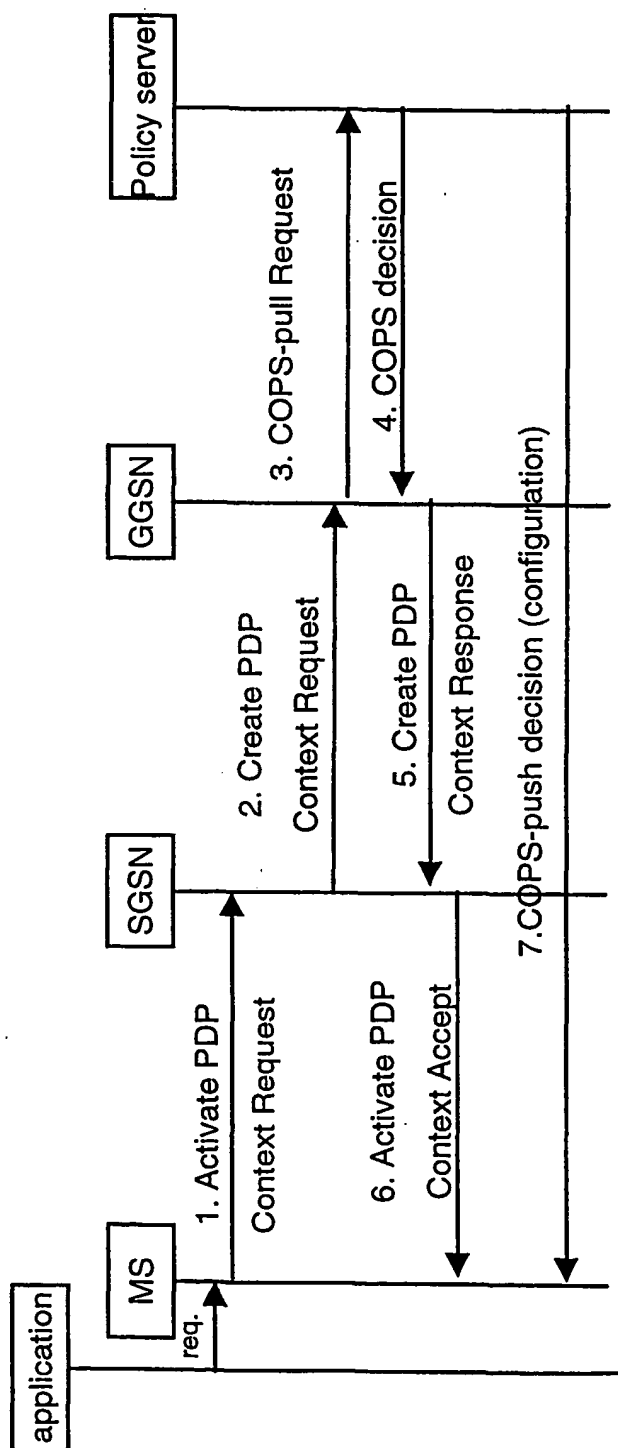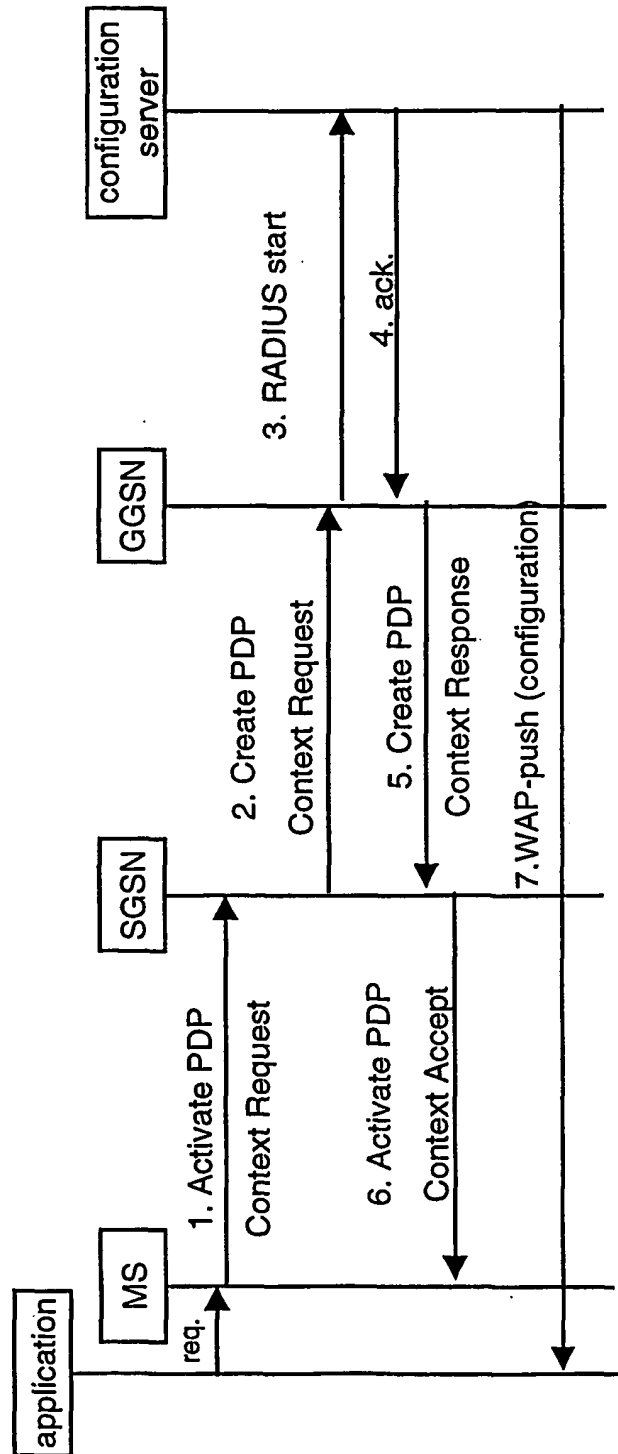accordance with the configuration information.

Fig. 1

Mapping for downlink:
ToS8 →PDPcontext 1(interactive)
ToS3 →PDPcontext 2(background)
ToS7 →PDPcontext 1(interactive)
ToS13 →PDP context 3(conversational)

Mapping for uplink:
ToS4→PDPcontext 1(interactive)
ToS3 →PDPcontext 2(background)
ToS5 →PDPcontext 1(interactive)
ToS11 →PDP context 3(conversational)

Operator IP network

Edge Router

Setting:
Q931=ToS7
UDP/RTP=ToS13

Media Gateway

PSTN

GGSN

H323 Gatekeeper

Configuration server

Setting:
Email=ToS3
Netscape=ToS8

Operator application server

MS

Laptop

Setting:
Netscape=ToS4
Email=ToS3
Q931=ToS5
UDP/RTP=ToS11

Fig. 2

Fig. 3

Fig. 4

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 01/06787

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7   H04Q7/22   H04L12/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7   H04Q   H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 99 05828 A (ERICSSON TELEFON AB L M) 4 February 1999 (1999-02-04) abstract page 1, line 10 -page 10, line 18 ---	1,14,19
A	WO 99 16266 A (ERICSSON TELEFON AB L M) 1 April 1999 (1999-04-01) abstract page 1, line 15 -page 13, line 8 ---	1,14,19
A	EP 0 818 907 A (AT & T CORP) 14 January 1998 (1998-01-14) abstract column 4, line 10 -column 7, line 10 -----	1,14,19

[ ] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 February 2002	08/03/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax (+31–70) 340–3016	Reeck, G

Form PCT/ISA/210 (second sheet) (July 1992)

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